# NEW SITE IDENTIFICATION

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| Part A – To Be Completed By Observer | Program Management |
|---|---|
| 1. **Person Initiating Report:** Walker F. Howell | **Phone:** 526-6530 |
| **Contractor WAG Manager:** Douglass J. Kuhns | **Phone:** 526-8226 |
| 2. **Site Title:** TAN IET Soils Beneath Sub-Grade Sumps within TAN-620/656 | IET-12 Mdl |

3. **Describe the conditions that indicate a possible inactive or unreported waste site. Include location and description of suspicious condition, amount or extent of condition and date observed. A location map and/or diagram identifying the site against controlled survey points or global positioning system descriptors shall be included to help with the site visit. Include any known common names or location descriptors for the waste site.**

*NOTE: The Consent Order resolving the 1997 Notice of Violation requires DOE-ID to submit this New Site Identification Form to the Idaho Division of Environmental Quality by July 4, 2000. This requirement is identified in section 5.15.g of the Consent Order. This form is currently under review by DOE-ID, and will adhere to the FFA/CO process. Full resolution of Item 5.15 .g will occur upon approval of this form.*

The Test Area North (TAN) Initial Engine Test (IET) facility was built originally for the Aircraft Nuclear Propulsion Program (ANP) in the 1950s and is located approximately 1.4 miles north of the TAN Test Support Facility (TSF) and consists of the Control and Equipment Building (TAN 620), Change Room Building (TAN-656), and interconnecting railroad and piping between TAN-620 and TSF security fence (see Figures in Attachment 1). Due to the nuclear-related operations of the ANP, the TAN 620/656 structure was built below ground of high density concrete and covered with several feet of soil for radiological protection. During the many years of operations conducted within the TAN IET facility (these included the ANP, the Space Nuclear Power Transient Program, Hallam Decontamination and Dismantlement (D&D) Project, storage of excess equipment and materials from TSF, and Idaho National Engineering and Environmental Laboratory (INEEL) security training), a number of sumps were used for the collection and conveyance of wastewater (including sanitary wastes and overflow water) within the IET septic system. Wastes from these sumps were ultimately discharged to the facility's septic and leach tank.

Fourteen identified sumps (the sumps were numbered 1 through 13 for tracking and sampling purposes; the floor trench was not assigned a number by the D&D Project engineer) located within TAN 620 and 656, are sub-floor, concrete-formed, and had dimensions varying between 3 to 8 feet deep and up to 4 feet wide. Twelve of the 14 sumps are located 15 feet below land surface (bls). The Floor Trench, at the top of a stairwell leading to the Coupling Station Observation Room (0 ft bls), and one shallow (e.g., 3 feet) sump located within a subgrade electrical vault, approximately 10 feet below the floor (28 ft bls) are exceptions to this configuration. Four of the sumps are also equipped with carbon steel metal liners. Initial inspection of the sumps conducted in January 1998 prior to planned D&D activities determined that four of the sumps were dry (e.g., dry scale and rust), while the sumps with measurable volumes of wastes contained a combination of water, sediment, scale and rust, and sludge. D&D of the TAN 620/656 structures began in 1998, are currently ongoing, and will be completed in 2000.

An Idaho Division of Environmental Quality (DEQ) Resource Conservation and Recovery Act (RCRA) inspection of the INEEL in November 1996 included the TAN IET facility. The inspection subsequently resulted in the issuance of a notice of violation identifying, among other things, the INEEL's lack of having prepared hazardous waste determinations for wastes and samples inside the TAN IET facility. Following negotiations with the DEQ, a May 6, 1999 Consent Order (CO) was issued to the Department of Energy Idaho Operations Office (DOE-ID). The CO required the INEEL to perform certain activities inside the TAN IET 620 and 656 structures, including properly characterizing the contents of the 14 identified sumps, and determining the potential of release of hazardous constituents (if detected in sumps) to the environment.

The hazardous waste determination (HWD) that was submitted to the DEQ in June 1999 for waste contained in the sumps was based on process knowledge and analytical data for TCLP contaminants from the sumps in October 1998. It concluded that none of the sumps contained any RCRA characteristic waste based on analytical data, and did not receive any RCRA-listed waste based on process knowledge. However, per the CO language, because all the sumps contained detectable hazardous constituents (identified under 40 CFR 261, Appendix VIII), further actions were necessary to satisfy the CO. These include the following actions for all sumps: (1) removing the contents of the sumps, (2) cleaning and/or removal of the sumps, (3) determining whether sump contents were released to the environment (all sumps except 98TAN00130 - Floor Trench), and (4) if required, remedial response. The Consent Order stated that "to the extent practicable, remove any soils contaminated with metals (above background) and/or organics (above the FFA/CO Track 2 risk assessment protocol at $10^{-4}$ and/or hazard index of 1)." It further stated that if any hazardous constituents remained in soils, DOE-ID was to submit a New Site Identification Form pursuant to the FFA/CO.

DOE-ID was given the option of determining whether any waste constituents had been released to the environment from these sumps (except Floor Trench) by either sampling soils beneath the bottom of the sumps or by conducting tank integrity testing. The

3. D&D Project Engineer decided to pursue sampling of the soils beneath each sump rather than performing tank integrity testing. To facilitate the collection of soils beneath the sumps, the sump floors were mechanically cored during October and November 1999, with actual sampling of the soils beneath 12 of the sumps (grab sample generally 0 to 6 inches below the sump bottom) conducted during November 1999 and January 2000. To determine whether any of the soils had been impacted by possible releases from the sumps, samples were analyzed for volatile and semi-volatile organic compounds, PCBs, total metals and radionuclides. Also, when sampling was conducted, a Ludlum 2A hand-held frisker was used to identify whether radionuclide contamination was present. The frisker did not detect radionuclide contamination in the soils underneath the sumps, though laboratory analysis did detect very low levels of some radionuclides. The data received from the laboratory and later validated reported several positive concentrations for metals and organic compounds.

   The concentrations of several metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, zinc, silver, and vanadium, were determined to be above INEEL background concentrations at the 95-99% upper threshold limit for composite samples (most conservative) (reference *Executive Summary for Background Dose Equivalent rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory*, INEL-94/0250, September 1995) in the soil samples collected beneath the sumps (see Table 1 in Attachment 2 for maximum detection concentrations and INEEL background levels).

   Several organic compounds were also detected. The highest concentrations were for polynuclear aromatic hydrocarbons (PAHs) in soils beneath Sumps 4 and 5 (see Table 2 in Attachment 2 for analytical results).

   Volatile organic compounds (VOCs) were generally at much lower concentrations, with the highest values including 2-butanone (0.01 mg/kg), bromomethane (0.002 mg/kg), toluene (0.001 mg/kg), xylene (0.26 mg/kg), benzene (0.004 mg/kg), and ethylbenzene (0.018 mg/kg).

   Soil beneath sumps 3,4, 5, 6, 9, 10, 11, and 12 was sampled for radionuclides. Cs-137 was detected in soil beneath sump 3 at a concentration of 0.16 pCi/g. Ra-226 was detected (J-flagged) in each soil sample. The estimated concentrations of Ra-226 ranged from 2.1 to 3.8 pCi/g. Am-241 and U-235 were detected in soil beneath sump 3, with estimated concentrations of 0.037 and 0.056 pCi/g, respectively. Several isotopes of thorium and uranium were also found in soil beneath sump 3, with each isotope exhibiting a concentration of about 1.0 pCi/g. (See Table 3 in Attachment 2)

**Part B – To Be Completed By Contractor WAG Manager**

4. **Recommendation:**

☒ This site meets the requirements for an inactive waste site, requires investigation, and should be included in the INEEL FFA/CO Action Plan. Proposed Operable Unit assignment is recommended to be included in the FFA/CO.
WAG: 1 Operable Unit: 1-11

☐ This site DOES NOT meet the requirements for an inactive waste site, DOES NOT require investigation and SHOULD NOT be included in the INEEL FFA/CO Action Plan.

**5. Basis for the recommendation:**

**(1) Source Description:**

Possible sources of contamination that were detected as hazardous constituents in soils beneath the TAN 620/656 structure include the TAN IET sumps and historical petroleum fuel releases from tanks, piping, and valves.

Sumps:

The sumps were used to contain sanitary and/or industrial wastewater, and overflow water, perhaps from operational processes. Upon entry by INEEL contractors into the facility during late 1997 and early 1998, most of the sumps were determined to still contain waste residues left over from operational period. Four of the sumps were determined to be dry, containing only rust and scale. Much of the volume contained in the other 10 sumps was groundwater water that had seeped into the sumps from ambient soils that was mixed with sediment, rust, and sludges. Solids tended to settle at the bottom of these sumps.

Removal of the contents of the 13 sumps and one floor trench began in early August 1999. Upon content removal, thirteen of the sumps (excluding Sump No. 7) contained dry residues, combined sludge (solids) and liquid phases, and seepage water and required some degree of waste removal through pumping and/or vacuuming. This activity was performed using a 3-inch trash pump and later a wet-dry vacuum unit to complete removal of the contents. The sump removal process was completed in early October 1999. During this period, the contents were containerized within 53 55-gallon steel drums. The sump contents were managed according to their respective waste characterization, as determined by sampling and analyses performed during the fall of 1998. The majority of the drummed wastes were managed as low-level waste (LLW) only and initially staged inside of TAN-620 within a designated Radiological Materials Storage Area (RMSA).

Petroleum tanks, piping, and valving and Past Fueling Practices:

The ANP operations at the TAN IET facility were required to be supported by various petroleum products (e.g., diesel, heating oil, and several petroleum fuel tanks (storage capacities ranging from 5,000 gallons to 300,000 gallons) along with associated piping and valving were once present at the site. The HTRE engines were fueled with jet fuel supplied through piping and fuel dispensers. Many of these tanks were removed as part of the underground storage tank (UST) removal projects performed between 1990 and 1992. During 1998 and 1999, further UST work resulted in the removal of approximately 300 linear feet of jet fuel piping (and 150 gallons of fuel within the line) extending along the east and north side of the TAN 620/656 structure. During this time, an extensive amount of soil along the north side of the building was determined (confirmed by sampling) to have been contaminated from historical releases of fuel. During sampling of the soils beneath Sumps 4 and 5, noticeable petroleum odors emanated from soils beneath them. Sump 4 is located on the north side of the facility, adjacent to where the former jet fuel line was located, and Sump 5 is at the end of the Pedestrian Tunnel, almost directly beneath the coupling station pad where jet engines were fueled, tested, and maintained. Later, laboratory analyses of samples taken from these locations reported the presence of petroleum-derived contaminants. When compared to the analyses of the sump contents, the results indicate these contaminants (primarily PAHs and some volatile organics) originated from a petroleum source (tank or pipeline), or resulted from past fueling practices or other engine testing/maintenance activities.

**(2) Exposure Pathways:**

Due to the depth that the contamination is located (over 10-ft bls) the only exposure pathway to members of the public in the future would be groundwater ingestion. However, due to the low concentrations of the potential contaminants of concern (as identified in section 3) risk to groundwater is not a concern. Other potential pathways include risk to current workers during D&D activities if the sumps are removed. These potential pathways include inhalation, ingestion, and direct exposure to ionizing radiation.

**(3) Potential Contaminants of Concern:**

Metals:

As indicated in Section 3, several metals in soils beneath the sumps were detected at or above INEEL 95-99% UTL grab background values (INEEL Limitation and Validation Reports were used to identify contaminants that indicated detectable concentrations). Because these concentrations were not significantly above background, D&D determined that a risk assessment would be performed on the analytical data (metals and organics) produced for the soil samples collected below the TAN IET sumps to determine if the levels warranted the removal of any soils. The methodology for performing this risk analysis was taken from the *Track 2 Sites: Guidance for Assessing Low Probability Hazard Sites at the INEL*. The scenario was modeled for future residential occupancy. These contaminants were then screened against known background levels for metals at the INEEL site (*Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the INEL*, S.M. Rood et al). Any contaminant samples that exceeded the background levels for metals were then screened against the EPA Region 9's Preliminary Remediation Goals (*Preliminary Remediation Goals*, S.J. Smucker, Ph.D.) for Residential Soils. The samples that exceeded the Region 9 PRGs were further evaluated for either cancer risk or hazard quotient according to the concentration in the sample.

5. The only metal that did not pass the risk screening process (i.e., of analytical data produced from sampling) was arsenic. Process knowledge of operations conducted within TAN IET does not specifically identify any processes in which arsenic-containing compounds were used or stored.

Organic Compounds:

Sampling and analysis identified non-metal contaminants within the underlying soils of the IET sumps that exceeded Region 9 PRGs and/or State of Idaho Risk Based Corrective Action (RBCA) Tier 0 limits. The SVOC constituents were screened against both the EPA Region 9 PRGs and the RBCA guidelines. As discussed earlier it was determined that the PAH contamination originated from petroleum releases. Petroleum releases in the State of Idaho are regulated under the State of Idaho RBCA.

Since the contaminants exceeded the Tier 0 concentrations a further RBCA analysis was performed using the State of Idaho RBCA modeling software. The results of the modeling concluded that no petroleum constituents pose a risk greater than 1E-6 or a hazard index greater than 0.2. The D&D program is currently closing this petroleum release site with the State of Idaho through the RBCA process.

Radiological Constituents

The maximum concentration of each radionuclide detected in the sumps was compared with the Radionuclide Risk-Based Tables (Memorandum dated January 3, 1996 from Jeff Fromm, Idaho Department of Environmental Quality, Remediation Bureau, and addressed to INEL WAG Managers and Technical Support Staff, Subject: Radionuclide Risk-Based Concentration Tables). The 1E-06 risk-based concentrations listed in the memo for each radionuclide decayed through the exposure period were used for this comparison. Of the radionuclides detected, Th-228, U-238, Cs-137, and Ra-226 were present in concentrations that exceed the 1E-06 risk level for the current residential scenario. For the 100-year residential risk scenario, U-238 and Ra-226 exceeded their respective 1E-06 risk-based concentrations. Only Ra-226 exceeded the 1E-04 risk level for either residential scenario, with a maximum concentration of 3.8 pCi/g. Given the "J" quality flag assigned to the Ra-226 data, the maximum concentration is within the expected range for naturally-occurring concentrations.

Conclusion

Based on the above information this site meets the definition of a solid waste management unit, requiring investigation. It should be included in the INEEL FFA/CO action plan.

**The basis for recommendation must include: (1) source description; (2) exposure pathways; (3) potential contaminants of concern; and (4) descriptions of interfaces with other programs, as applicable (e.g., D&D, Facility Operations, etc.)**

6. Contractor WAG Manager Certification: I have examined the proposed site and the information submitted in this document and believe the information to be true, accurate, and complete. My recommendation is indicated in Section 4 above.

Name: DJ Kuhns Signature: DJ Kuhns Date: 8-31-00

**Part C – To Be Completed By INEEL FFACO/CO WAG Managers**

7. WAG Operable Unit:

DOE WAG Manager Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: R M Shaw

Date: 8/31/00

EPA WAG Manager Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: R Matthew Wellman

Date: 8/31/00

State of Idaho WAG Manager Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: Judy Cody

Date: 8/31/00

Explanation follows:

**Part D – To Be Completed By The INEEL FFA/CO Responsible Program Managers (RPM's)**

8. FFA/CO RPM's Concurrence:

**For DOE-ID**

Name: Kathleen Hain Signature: Kathleen S Hain Date: 9 / 6 / 00

☒ Concur
☐ Do not concur. Explanation follows:

**For EPA Region X**

Name: Wayne Pierre Signature: Wayne Pierre Date: 9/5/00

☒ Concur
☐ Do not concur. Explanation follows:

**For State of Idaho**

Name: Dean Nygard Signature: Dean J Nygard Date: 9 / 28 / 00

☒ Concur
☐ Do not concur. Explanation follows:

# Attachment 1

# Figures

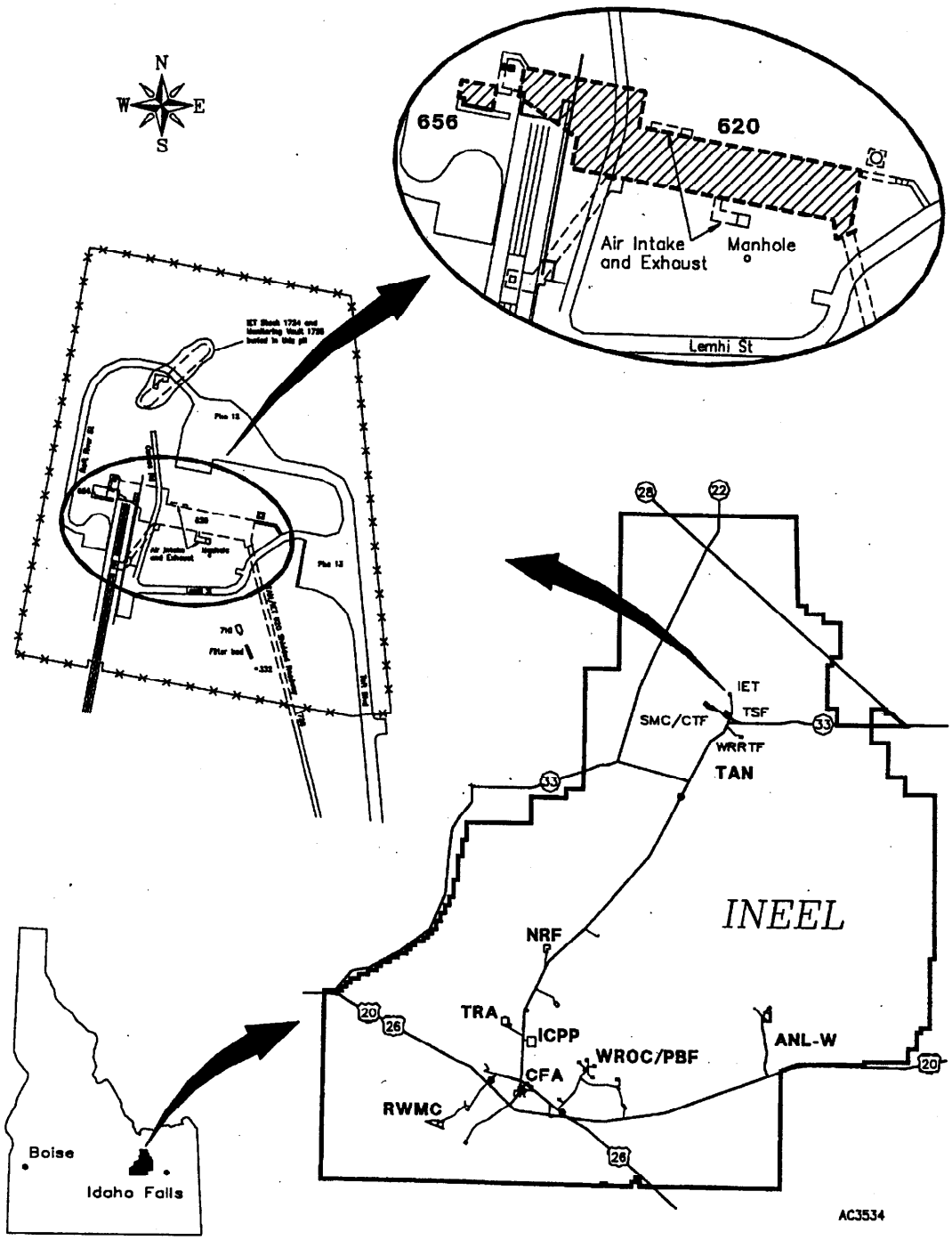


Figure 1. Location of IET Buildings 620 and 656 at the INEEL.

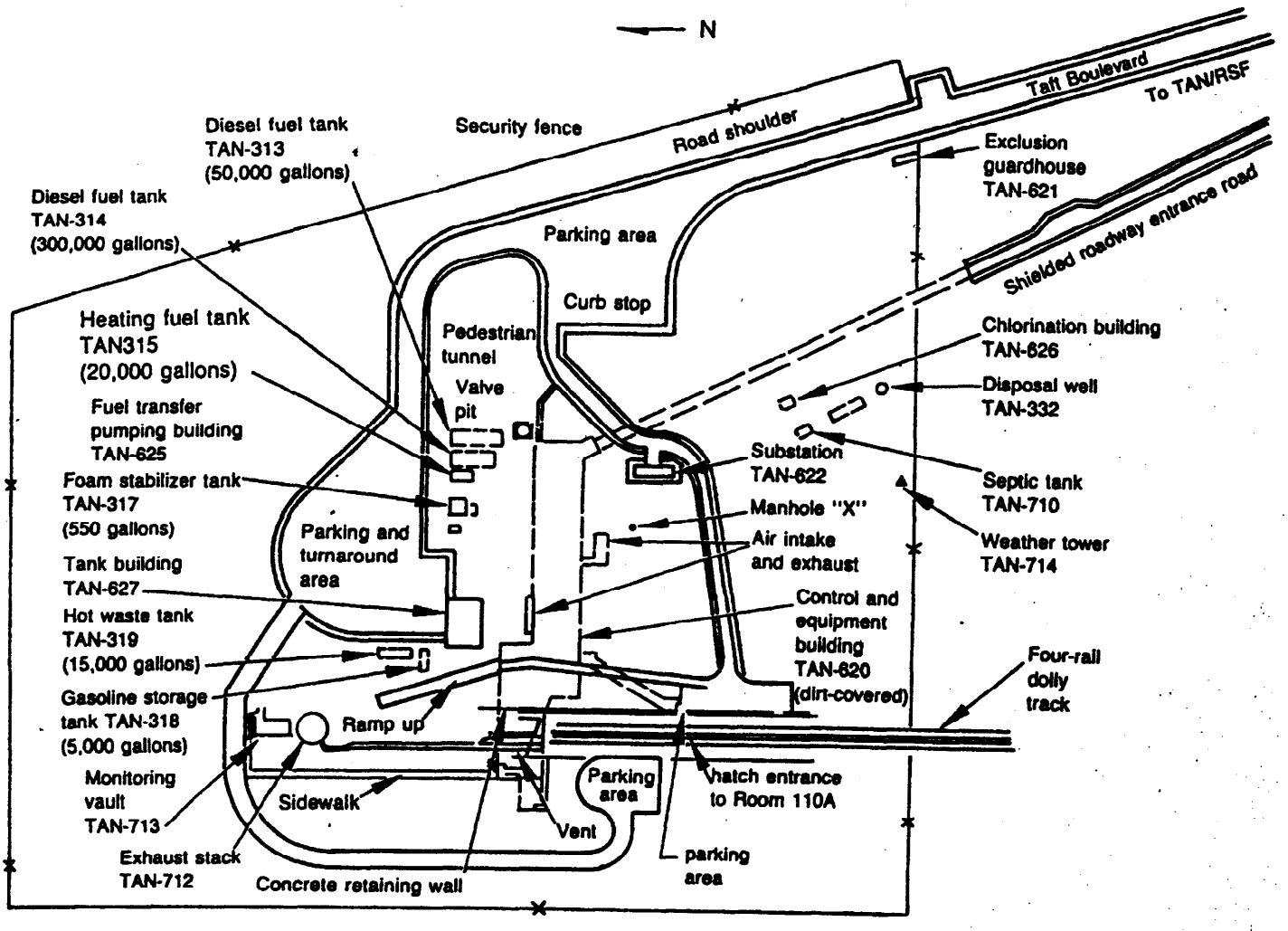


Figure 2. Plot plan of the IET facility.

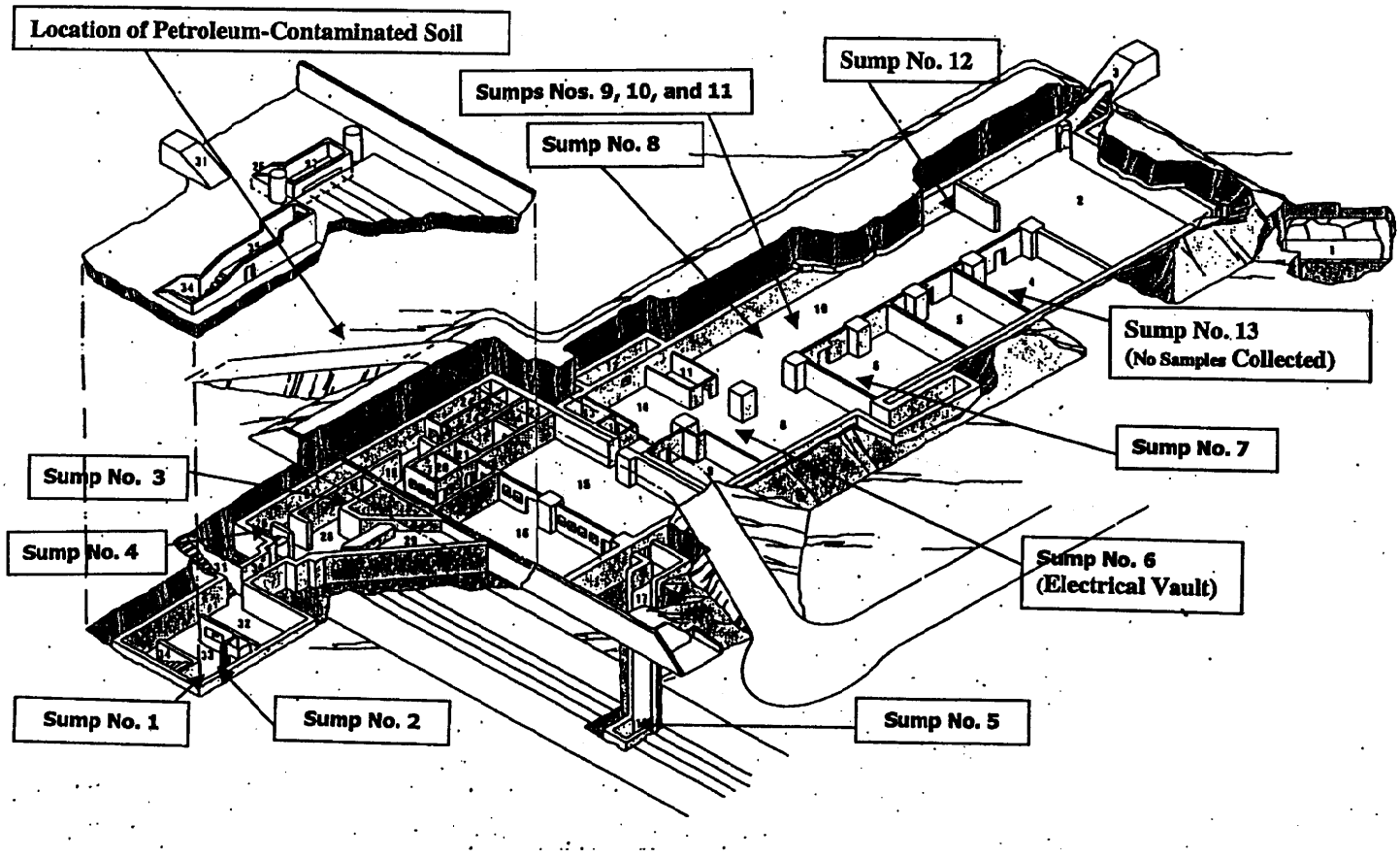


Figure 3. Location of sump samples in IET Building 620.

# Attachment 2

# Data Results

Table 1. Maximum metal concentrations and INEEL background concentrations for soil samples.

| Metal | Max. Detection (mg/kg) | Max Detection under Which Sump? | INEEL Background (mg/kg) | Above Region 9 PRGs? | Site COPC? |
|---|---|---|---|---|---|
| Aluminum | 17,800 | 8 | 16,000 | No | No |
| Arsenic | 23.4 | 1 | 5.8 | Yes | No[a] |
| Barium | 308 | 8 | 300 | No | No |
| Cadmium | 3.0 | 1 | 2.2 | No | No |
| Chromium (Total) | 48.8 | 1 | 33 | No | No |
| Cobalt | 23.1 | 1 | 11 | No | No |
| Copper | 84.2 | 1 | 22 | No | No |
| Lead | 136 | 1 | 17 | No | No |
| Manganese | 710 | 1 | 490 | No | No |
| Mercury | 0.16 | 12 | 0.05 | No | No |
| Nickel | 79.5 | 1 | 35 | No | No |
| Selenium | 2.2 | 1 | 0.34 | No | No |
| Silver | 4.5 | 7 | No Data | No | No |
| Vanadium | 50.9 | 8 | 45 | No | No |
| Zinc | 157 | 1 | 150 | No | No |

a. Contaminant is not considered a site COPC because there are no known processes at TAN that used arsenic, and arsenic has been found to be naturally occurring at high concentrations at TAN.

Table 2. PAH concentrations detected underneath sumps.

| PAH | Max. Detection (mg/kg) | Max Detection under Which Sump? | Above Region 9 PRGs? | Above RBCA Tier 0? | Site COPC? |
|---|---|---|---|---|---|
| 2-Methylnaphthalene | 2.6 | 4 | No Data | N/A | No[a] |
| Anthracene | 0.32 | 5 | No | No | No |
| Benzo [a] anthracene | 1.3 | 5 | Yes | Yes | No[b] |
| Benzo [b] fluoranthene | 1.8 | 5 | Yes | Yes | No[b] |
| Benzo [k] fluoranthene | 0.74 | 5 | No | No | No |
| Benzo [g,h,i] perylene | 0.31 | 5 | No Data | No | No |
| Benzo [a] pyrene | 1.1 | 5 | Yes | Yes | No[b] |
| Chrysene | 1 | 5 | No | Yes | No[b] |
| Indeno [1,2,3-cd] pyrene | 0.39 | 5 | No | N/A | No |
| Napthalene | 0.4 | 4 | No | No | No |
| Phenanthrene | 1.6 | 5 | No Data | No | No |
| Pyrene | 2.3 | 5 | No Data | No | No |

a. Neither the Region 9 PRGs nor the Idaho RBCA manual contained any toxicity information on this PAH compound, and a search of the EPA's internet site Integrated Risk Information System (IRIS) also revealed no toxicity information. The EPA Region 10 PRGs listed the Risk-Based Concentrations for 2-methylnaphthalene as "N/A." The only reference source that contained any information on this compound was Dangerous Properties of Industrial Materials, Seventh Edition (N.I. Sax et al). The toxicity and hazard reviews (THRs) indicated that 2-Methylnaphthalene was "Moderately toxic by ingestion and intraperitoneal routes. Because no toxicity information on 2-Methylnaphthalene relating to human health risk could be found, it was assumed to not be a contaminant of concern.

b. Since the contaminants exceeded the Tier 0 concentrations a further RBCA analysis was performed using the State of Idaho RBCA modeling software. The results of the modeling concluded that no petroleum constituents pose a risk greater than 1E-6 or a hazard index greater than 0.2. The D&D program is currently closing this petroleum release site with the State of Idaho through the RBCA process.

Table 3. Radionuclide concentrations detected underneath sumps.

| Radionuclide | Max. Detection (mg/kg) | Max Detection under Which Sump? | Above 1E-06 RBSL[a] ? | Above 1E-04 RBSL[a]? | Site COPC? |
|---|---|---|---|---|---|
| Am-241 | 0.0369 (J) | 3 | No | No | No |
| Th-228 | 1.26 | 3 | Yes | No | No |
| Th-230 | 1.38 | 3 | No | No | No |
| Th-232 | 1.13 | 3 | No | No | No |
| U-234 | 1.04 | 3 | No | No | No |
| U-235 | 0.0559 (J) | 3 | No | No | No |
| U-238 | 1.00 | 3 | Yes | No | No |
| Ra-226 | 3.84 (J) | 12 | Yes | Yes | No[b] |
| Cs-137 | 0.155 | 3 | Yes | No | No |

a. Either the current or 100-year future residential scenario, per Fromm, 1996

b. This qualitative radium result is within the expected range of naturally occurring concentrations in soil.